

Delft University of Technology
NB1140: Physics 1A - Classical mechanics and Thermodynamics
November 2016 ~ January 2017

Course website: <http://www.youklab.org/teaching/physics1a.html>

Textbook: Essential university physics - Volume 1 (3rd edition, with Mastering Physics) by Wolfson.

Lecturer: Hyun Youk (hyouk.physics1a@gmail.com)

Lectures:

- Tuesdays, 13:45 - 15:45 in Aula Collegezaal D
- Wednesdays, 13:45 - 15:45 in Building 58, Franklinzaal (A2.050) and Watermanzaal (A2.110) combined

Problem solving sessions by Teaching Assistants (TAs):

Each student attends only one section. All sections are in building 58.

- Group 1: Wednesdays, 15:45 - 16:45 (**before** midterm exam); 16:45 - 17:45 (**after** midterm exam)
 - Franklinzaal (A2.050): Max Betjes' section
 - Watermanzaal (A2.110): Tim Allertz's section
 - Projectruimte (B2.100): Teun Huijben's section
 - Projectruimte (B2.160): Renske Voerman's section
- Group 2: Wednesdays, 16:45 - 17:45 (**before** midterm exam); 15:45 - 16:45 (**after** midterm exam);
 - Franklinzaal (A2.050): Hiran Daneshpour's section
 - Watermanzaal (A2.110): Federico Fanalista's section
 - Projectruimte (B2.100): Diego Gomez-Alvarez's section
 - Projectruimte (B2.160): Misha Klein's section

Grading scheme:

- "Mastering physics" (web-based problems) - [5%]
- Attendance and participation in problem solving sections - [5%]
- Quiz 1 (23 November 2016) - [5%]
- Quiz 2 (7 December 2016) - [5%]
- Quiz 3 (18 January 2017) - [5%]
- Quiz 4 (25 January 2017) - [5%]
- Midterm exam (14 December 2016) - [35% or 45%]
- Final exam (1 February 2017) - [35% or 45%]

Goals of this course:

This course has two primary goals: (1) Teach you laws that govern how objects larger than molecules move (i.e., "classical mechanics") and how matter behaves at different temperatures (thermodynamics), and (2) Train you to become a more skilled problem solver. The second goal is actually more important than the first. No matter what profession you end up in, the ability to use quantitative skills to solve scientific and real-world problems is the most valuable skill that you can have. Just like physical exercises such as running and lifting weights progressively build your physical strength, solving physics problems can build your problem solving abilities and "physical intuition" (i.e., mental images of how the world works based on physical laws). There is no substitute for becoming a better problem solver than solving many problems. This is the reason that you are asked to actively think about and solve problems in Mastering physics and problem sets. Defective methods for studying physics are: Memorizing formulas or solutions to specific problems, reading a book, and seeing someone else (TA or your friend) solving a problem. The *only* effective method for studying physics is actively working and struggling through difficult problems until you solve them yourself (with some hints are okay). Even when problems are incredibly difficult, please do not give up. It is perfectly normal to be stuck on the same problem for hours or days until you hit on the right solution. If you are stuck, ask for hints instead of full solutions. Your TAs can give you hints to problems in the problem sets and mastering physics.

If you ever find yourself discouraged, remember this: *All of those famous scientists who lived before Newton (e.g. Aristotle, Galileo, Archimedes, Euclid) never understood Newton's laws and could not solve the problems that you'll be solving.*

Mastering physics:

"Mastering physics" is an online program whose access code you purchased with the textbook. It asks you to solve problems that are basically replicas of the problems in your book. So if you want to check your answers to any problem in the book (even those problems without an answer at the back of the book), you can try solving those questions on Mastering physics and then check your solutions. Just before the midterm and final exams, you will receive a grade for your efforts on solving mastering physics problems that are relevant to each exam. You will not be punished for any wrong answers. You will not be rewarded for any correct answers. You will get one of three possible grades, 0, 1.25, or 2.5, before each exam based solely on how many questions you attempted to solve up to that point. If you answered more than 50% of the problems on Mastering physics that are relevant to each exam, then you will get a 2.5 (twice, thus a total of 5.0).

Problem sets (not graded):

Each week, you will get a problem set that covers that week's material. You will not get a grade for doing the problem sets. You will not submit your solutions for grading. However, the bi-weekly quizzes will ask you one of the problems on these problem sets. Also, about 1/3 of the midterm and final exams will contain problems that are exactly or nearly identical to the problems in the problem sets. These problems will be challenging but not impossible to solve if you understand the material from the lectures and problem solving sessions. For each problem set, you can download their solutions from our course website after 1 week.

Attendance and participation in problem solving sections:

After each Wednesday's lecture, you will attend a particular problem solving section with a TA that you have been assigned to. For fairness to others, you cannot change your section. About 50% of the class will attend their section during 15:45 - 16:45 while the other 50% of the class will attend the later sections during 16:45 - 17:45 before the midterm exam. After the midterm exam, for fairness, the two groups will

switch their section times but remain with the same TA. Your TA will grade your quiz and give you a grade for attendance and participation. Your TA will not take an attendance everyday although he/she might do so on randomly chosen days for sampling your attendance rate. You are encouraged to ask questions and participate during your TA's problem solving sessions. For your efforts, your TA will give you a grade of either 0, 2.5%, or 5% for your participation and attendance at the end of the course.

Quizzes:

There will be four quizzes, occurring almost every two weeks. Each quiz will have one short problem that is taken directly from the problem sets. You will be told beforehand which problem will appear on the quizzes. Your TA will give you a 10-minute quiz at the beginning of his/her problem solving section in the weeks indicated above.

Midterm and final exams:

For both exams, about 1/3 of the problems will be (exactly / nearly) identical to the problems that you solve on Mastering physics (which are replicas of the problems in your textbook), approximately 1/3 of the problems on the exams will be (exactly / nearly) identical to the problems on the problem sets, and the remaining 1/3 of the problems will be new problems that you should be able to solve if you really understood the material.

The midterm exam is worth 45% of your final grade if your combined scores for Quiz 1 and Quiz 2 are too low (i.e., you do well on Exam I so that having it count 45% and dropping the scores for the two quizzes are advantageous. Otherwise, the midterm exam is worth 35% and your grades for Quiz 1 and Quiz 2 will each count as 5% of your final grade. The midterm exam will cover the 1st half of the course. The final exam can "replace" your grades for Quiz 3 and Quiz 4 according to the rules that are analogous to the rules for the midterm exam.

What is the difference between Mastering physics (problems in your book) and the problem sets?:

- *Mastering physics problems (problems in your book):* Problems often require numerical solutions (i.e., putting in numbers into a formula or getting a numerical answer). These are "standard" textbook physics problems.
- *Problem sets:* Problems focus on working with symbols and deriving formulas. These problems are also a bit more challenging and may require more time than the problems in your book. These problems often deal with real-world / biological examples.

Schedule of topics

See the revised schedule of topics on our course webpage: <http://www.youklab.org/teaching/physics1a.html>